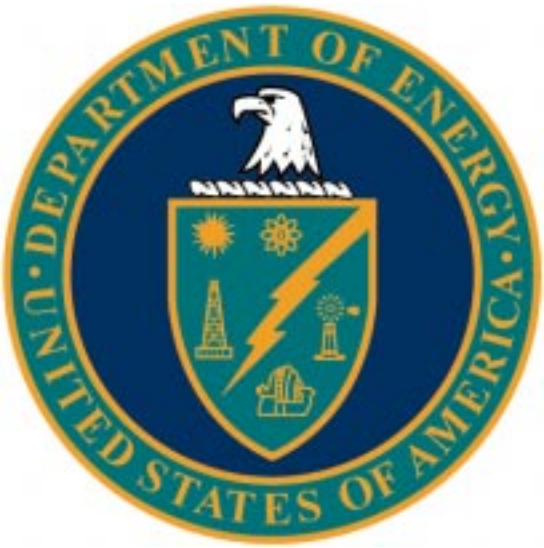
Appendix A

Review Plan For The Criticality Safety Program At The Plutonium Finishing Plant

March 27, 1998

REVIEW PLAN FOR THE CRITICALITY SAFETY PROGRAM AT THE PLUTONIUM FINISHING PLANT



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REVIEW OF THE CRITICALITY SAFETY PROGRAM AT THE PLUTONIUM FINISHING PLANT

PURPOSE

The purpose of this review is to provide an expert, comprehensive review of the criticality safety program at the Plutonium Finishing Plant (PFP) in advance of the Phase 2 Operational Readiness Review (ORR) for restarting operations. The review is comprehensive in that those elements affecting the PFP criticality safety program at Fluor Daniels Northwest (FDNW), Fluor Daniels Hanford (FDH), and Dyncorp are included. FDNW is an enterprise company providing criticality safety engineering services to PFP. FDH is the integrating management contractor with overall responsibility for PFP. Dyncorp provides fire fighting services for PFP. The continued viability of a robust criticality safety program at PFP is essential to protect workers from undue risk of a criticality accident. This review will evaluate whether the program meets the requirements of ANSI/ANS-8.19, *Administrative Practices for Nuclear Criticality Safety*, as well as related ANSI/ANS-8 series standards. These standards represent the best practices for criticality safety programs and are mandatory under DOE Orders 5480.24 and its successor 420.1.

BACKGROUND

One of the current missions of Hanford's Plutonium Finishing Plant is to process legacy residue and wastes to reduce the overall risk of storage of these fissile materials. These Transition Operations have been curtailed for the past year while management has attempted to implement improvements in the conduct of operations and in the criticality safety program. This criticality safety program review is being performed in advance of the Phase 2 Transition Operations ORR which currently includes thermal stabilization and can handling operations. A brief review was performed in December of 1997 that focused on operational aspects of the criticality safety program as they pertained to the Phase 1 restart activities only. Several recommendations for improvement of the criticality safety program resulted from the December, 1997 activity. This review is a comprehensive follow-up to the December 1997 review. Both reviews were requested by the DOE RL Assistant Manager for Transition Operations and directly support line management's preparations for restarting transition operations at PFP.

REVIEW SCOPE

This review will encompass all elements of the criticality safety program impacting PFP. There are four different companies covered by this review: Fluor Daniel Hanford (FDH), the integrating management contractor, Babcock and Wilcox Hanford Company (BWHC), responsible for operating PFP, Fluor Daniels Northwest (FDNW), responsible for all criticality engineering services, and Dyncorp, responsible for the fire department supporting PFP. In addition to these four companies, this review will include the DOE RL criticality safety activities. The network of companies must function as a team to ensure that criticality safety practices conform to the

expectations of the DOE Orders and the applicable national consensus ANSI/ANS Standards. This teamwork must result in the following outcome:

An effective nuclear criticality safety program includes cooperation among management, supervision, and the criticality safety staff and relies upon conformance with operating procedures by all employees. (Introduction to ANSI/ANS-8.19)

In May of 1997 the Defense Nuclear Facility Safety Board (Board) issued Recommendation 97-2 dealing with criticality safety. Among the nine specific recommendations made were 1)the need for DOE Sites to maintain a formally trained and qualified nuclear criticality safety staff including hands on experience at critical mass laboratories; 2) the use of simplified bounding methods of setting subcritical limits with priority given to existing experimental data; 3) line management ownership of criticality safety; and, 4) the formation of a core group of criticality safety experts available to assist the DOE with criticality safety related issues. The Board's recommendations were used to develop several specific lines of inquiry for this review. In addition, three members of the review team (Garcia, McKamy, and Reilly) were intimately involved in preparing the DOE implementation plan responding to Board Recommendation 97-2 and are charter members of the Criticality Safety Support Group formed to assist DOE with criticality safety matters.

The applicable DOE Order for criticality safety is 5480.24. DOE Order 420.1 which replaced the older order has not been incorporated into contracts at Hanford. DOE Order 5480.24 mandates compliance with certain ANSI/ANS Standards for criticality safety. The review areas were drawn from the mandatory Standard, ANSI/ANS-8.19, *Administrative Practices for Nuclear Criticality Safety*, and are categorized as follows:

- Management Responsibilities - Management demonstrates ownership and participation in the criticality safety program; authorities and responsibilities are defined, understood and implemented; management provides a nuclear criticality safety staff that is competent in the physics of criticality and associated safety practices as well as familiar with fissile material operations; management ensures that the nuclear criticality safety staff is independent of line management to the extent practicable; management assigns responsibility for criticality safety in a manner consistent with other safety disciplines; and, management establishes means of monitoring the criticality safety program and obtains feedback on the overall effectiveness of the program.

- Supervisory Responsibilities - Line supervision accepts responsibility for the criticality safety of their operations; supervisors understand the controls, contingencies, and criticality safety basis for operations under their control; classroom and job-specific training in criticality safety is provided to personnel; procedures govern all work and there are effective change control and configuration control mechanisms; supervisors verify compliance with criticality safety specifications before authorizing work; and supervisors require conformance with good safety practices, good housekeeping, and unambiguous identification of fissile materials.

- Nuclear Criticality Safety Staff Responsibilities - The nuclear criticality safety staff is comprised of specialists skilled in the techniques of nuclear criticality safety assessment and

familiar with plant operations while, to the extent practicable, administratively independent of line management; the staff provides technical guidance for design of equipment, processes, and procedures; the staff reviews modifications to equipment, process, and procedures involving fissile material; the staff maintains familiarity with criticality codes, guides, standards, and best practices; the staff is interactive, both internally and externally having access to criticality safety professionals to provide assistance as needed; the staff understands the physics of criticality and makes use of experimental data, handbook data, and bounding methods where applicable; the staff participates in training personnel; the staff participates in audits of operations; and the staff examines reports of procedural violations and criticality infractions and recommends improvements in safety practices to management.

- Operating Procedures - Procedures are written and organized to facilitate operator use and understanding; procedures contain criticality controls; mechanisms are in place to facilitate revising and improving procedures on a periodic basis; new or revised procedures involving fissile material are reviewed by the nuclear criticality safety staff; procedures are supplemented by postings; postings are easily visible, understood by operators and contain clear, and contain all criticality controls implemented by the operator; deviations from procedures and processes and criticality infractions are investigated promptly, documented, reported to management, categorized according to approved procedures, and actions are identified to prevent recurrence; criticality infractions are resolved in a timely manner; and, operations are reviewed frequently (at least annually) to assure that processes and procedures have not been altered in a way so as to affect the applicable nuclear criticality safety evaluation.

- Process Evaluation for Nuclear Criticality Safety - All fissile material operations are analyzed to show that the processes will remain subcritical under all normal and credible abnormal conditions; the criticality safety evaluation is documented in a clear unambiguous manner; contingencies and controls are explicitly identified; calculational methods are properly validated; priority is placed on experimental data, handbook values, and bounding methods where applicable; engineered safety features are relied on to provide criticality safety to the extent practicable; procedures for producing criticality safety evaluations, limits, and postings are used; and criticality safety evaluations are independently peer reviewed before operations are authorized.

- Materials Control - Movement of fissile materials is controlled; fissile material is labeled including mass, chemical form, and isotopic composition; storage areas are posted with applicable criticality safety limits; methods are established to monitor the presence and effectiveness of credited neutron absorbers; access to fissile material handling areas is controlled and fissile material handler qualification verified; and, control of spacing, mass, density and geometry of fissile material is maintained to assure subcriticality under all normal and credible abnormal conditions.

- Planned Response to Nuclear Criticality Accidents - Criticality accident detectors are capable of detecting the minimum accident of concern; the criticality accident alarm system (CAAS) is designed in such a way as to minimize false alarms; detector placement criteria for all permanent and temporary detectors is documented; a configuration management system is in

place to assure the ongoing functionality of the CAAS; the CAAS can alarm all areas of the facility by either audible or visible means; emergency response procedures for criticality accidents are in place; personnel are trained in evacuation procedures; evacuation routes and assembly points are identified; procedures for accounting for personnel are in place; criticality accident drills are conducted at least annually and are as realistic as practicable; advance arrangements are in place for the treatment of exposed and contaminated individuals; radiation monitoring equipment is available to response personnel; radiation monitoring personnel are trained; and, emergency procedures address re-entry of facilities and the membership of re-entry teams.

REVIEW REQUIREMENTS

1.0 MANAGEMENT RESPONSIBILITIES

Criteria: Management shall accept overall responsibility for safety of operations. Continuing interest in safety should be evident. (ANSI/ANS-8.19, Section 4.1)

- Does BWHC management demonstrate continuing interest in criticality safety at PFP as evidenced by conducting safety meetings, issuing safety bulletins, inspecting facilities on a regular basis, and ensuring continuous improvement in safety?
- Is BWHC management proactive in resolving potential criticality safety related issues as evidenced by developing corrective action plans to address concerns of employees?
- Does FDH management demonstrate continuing interest in criticality safety as evidenced by regular meetings with the PFP criticality safety representative?
- Does FDH regularly meet with FDNW criticality safety staff supporting PFP?
- Does FDH perform regular reviews of the criticality safety program at PFP?

Criteria: Management shall formulate nuclear criticality safety policy and make it known to all employees involved in operations with fissile material. (ANSI/ANS-8.19, Section 4.2)

- Does BWHC have a written criticality safety policy?
- Are all fissile material handlers and their supervisors familiar with the criticality safety policy?
- Does FDH have a written criticality safety policy?
- Is compliance to FDH criticality safety policy required of all subcontractors?

Criteria: Management shall assign responsibility and delegate commensurate authority to implement established policy. Responsibility for nuclear criticality safety should be assigned in a manner compatible with that for other safety disciplines. (ANSI/ANS-8.19, Section 4.3)

- Are the roles and responsibilities of the Criticality Safety Representative documented?
- Are the roles and responsibilities of the Facility Safety Representative documented?
- Are the roles and responsibilities of the Nuclear Criticality Safety Staff (i.e. criticality safety engineers) documented?
- Is there a clear distinction between the roles of the Criticality Safety Representative and the Nuclear Criticality Safety Staff?
- Is line management assigned responsibility for criticality safety?
- Has FDH assigned responsibility for oversight of nuclear criticality safety programs of its subcontractors?
- Has FDH assigned responsibility for assuring integration of BWHC and FDNW with respect to criticality safety?

Criteria: Management shall provide personnel familiar with the physics of nuclear criticality and with associated safety practices to furnish technical guidance appropriate to the scope of operations. This function should, to the extent practicable, be administratively independent of operations. (ANSI/ANS-8.19, Section 4.4)

- Does BWHC have contracts in place and sufficient funding to assure continuous support by Nuclear Criticality Safety Staff?

- Does the FDNW Nuclear Criticality Safety Staff have unilateral, unscheduled access to the facility and operations personnel?
- Does FDH have a plan or policy to assure BWHC has Nuclear Criticality Safety Staff familiar with PFP operations as an alternative or backup to FDNW?
- Does FDH have a program or plan in place to assure contract vehicles are in place that facilitate continuous availability of Nuclear Criticality Safety Staff familiar with PFP operations to BWHC?
- Does FDH criticality safety policy ensure that subcontractors use of Nuclear Criticality Safety Staff is administratively independent of operations to the extent practicable?
- Does FDH issue requirements for qualifications and training for Nuclear Criticality Safety Staff and Criticality Safety Representatives providing support to PFP?
- Is BWHC Nuclear Criticality Safety Staff administratively independent of operations?
- Do all members of the Nuclear Criticality Safety Staff have technical degrees in physics or nuclear engineering?
- Do all members of the Nuclear Criticality Safety Staff understand and know how to properly utilize monte carlo codes (e.g. KENO and MCNP), criticality safety handbooks, critical experiment data, hand-calculations, etc.?
- Are members of the Nuclear Criticality Safety Staff knowledgeable of abnormal process upsets applicable to PFP operations?

Criteria: Management shall establish a means for monitoring the nuclear criticality safety program. (ANSI/ANS-8.19, Section 4.5)

- Does BWHC line management routinely audit operations for compliance to criticality safety requirements?
- Does FDH assess the BWHC criticality safety program?
- Does FDH perform periodic self-assessments relative to its criticality safety program?
- Does FDH perform periodic assessments of the FDNW criticality safety program and capabilities?
- Does FDH track reported deficiencies and corrective actions to closure?
- Is the information and communications flow about criticality safety issues impeded by the contracting arrangement?
- Who is responsible for monitoring the criticality safety program?
- Do the contracting practices impose barriers to identifying and resolving criticality safety deficiencies?
- Are all deficiencies related to criticality safety entered in a corrective action tracking system?
- Are mechanisms in place to validate closure of all criticality safety related deficiencies?
- Does line management maintain awareness of criticality safety deficiencies through the use of a corrective action tracking system?
- Is there a program or procedure for trending deficiencies in the criticality safety program?
- Does FDH acquire and report trending data as it pertains to criticality safety?
- Does BWHC perform assessments of compliance to operating procedures?
- Does FDH assess implementation of conduct of operations at PFP?

Criteria: Management shall periodically participate in auditing the overall effectiveness of the nuclear criticality safety program. (ANSI/ANS-8.19, Section 4.6)

- Does FDH management participate in review teams or committees performing assessments of subcontractor criticality safety programs?
- Does BWHC management participate in review teams or committees to assess the PFP criticality safety program?
- Does FDNW perform management self-assessments of their criticality safety staff and program?

Criteria: Management may use consultants and nuclear criticality safety committees in achieving the objectives of the nuclear criticality safety program. (ANSI/ANS-8.19, Section 4.7)

- Does management utilize a nuclear criticality safety committee to assist in monitoring and improving the criticality safety program?
- If nuclear criticality safety committees are used, do they report directly to the President of the company or to the Plant Director?
- Are the findings from the nuclear criticality safety committee, or equivalent, entered into a tracking database and corrective actions implemented?
- Are outside consultants utilized to provide an independent viewpoint on the overall criticality safety program?

2.0 SUPERVISORY RESPONSIBILITIES

Criteria: Each supervisor shall accept responsibility for the safety of operations under his control. (ANSI/ANS-8.19, Section 5.1)

- Line supervisors accept responsibility for criticality safety of their operations. Is ownership demonstrated by the following: 1) approving criticality safety postings; 2) reviewing and approving criticality controls in procedures; 3) participating in the development of criticality safety evaluations; 4) providing to the Nuclear Criticality Safety Staff for preparing postulated criticality scenarios; and 5) approving criticality safety evaluations for operations?

Criteria: Each supervisor shall be knowledgeable in those aspects of nuclear criticality safety relevant to operations under his control. Training and assistance should be obtained from the nuclear criticality safety staff. (ANSI/ANS-8.19, Section 5.2)

- Are line supervisors familiar with the criticality accident scenarios in Criticality Safety Evaluation Reports (CSERs) supporting their operations?
- Do line supervisors understand the underlying assumptions in CSERs which involve configuration of equipment, facility modifications, isotopic composition, etc.?
- Is training to line supervisors provided by the Nuclear Criticality Safety Staff?
- Do the line supervisors have direct access to the Nuclear Criticality Safety Staff?
- Does line supervision know who the Nuclear Criticality Safety Staff is and how to contact them?
- Does line supervision know the safety basis for the criticality controls for their operations?

Criteria: Each supervisor shall provide training and shall require that the personnel under his supervision have an understanding of procedures and safety considerations such that they may be expected to perform their functions without undue risk. Records of training activities and verification of personnel understanding shall be maintained. (ANSI/ANS-8.19, Section 5.3)

At a minimum, operators receive criticality safety training in accordance with ANSI/ANS-8.20, "Nuclear Criticality Safety Training."

- Do supervisors provide job specific training on procedures?
- Are walkthroughs and dry-runs on procedures provided?
- Do pre-job briefs cover criticality controls specific to the operations at hand?
- Do plan-of-the-day meetings address criticality safety related topics like work restrictions due to criticality safety infractions, availability of new CPSs and postings, need for CSR or Nuclear Criticality Safety Staff participation, results of recent criticality safety assessments/surveillances, etc?

- Do supervisors maintain training records for their personnel?
- Do supervisors ensure that their personnel are current in criticality safety classroom training?
- Are there required reading records or other evidence that personnel are knowledgeable of changes to procedures, Criticality Prevention Specifications (CPSs), and criticality safety postings?
- Do supervisors ensure that personnel have demonstrated an understanding of modified or revised procedures, CPSs, or criticality safety postings prior to authorizing work?
- Are there records of job specific training on CPSs and criticality safety postings?
- Do supervisors request assistance from the Nuclear Criticality Safety Staff to provide training for operations personnel?
- Do firefighters receive criticality safety training?
- Are firefighters aware of any moderator controlled areas or processes?

Criteria: Supervisors shall develop or participate in the development of written procedures applicable to the operations under their control. Maintenance of these procedures to reflect changes in operation shall be a continuing supervisory responsibility. (ANSI/ANS-8.19, Section 5.4)

- Are all fissile material handling operations performed according to approved procedures?
- Do procedures incorporate all necessary criticality safety controls consistent with the CPS and CSER?
- Are operations personnel or supervision involved for developing procedures?
- Is there a mechanism to assure that only current, approved procedures, CPSs, CSERs, and postings are used for operations?
- Does a clear, unambiguous link between the CSER, CPS, procedure and posting exist such that it is traceable from floor level documentation?
- Is there a mechanism to ensure that OSR related controls and requirements in procedures or postings are not changed without proper analysis and approval?
- Are Unreviewed Safety Question Determinations made for all procedure modifications?

Criteria: Supervisors shall verify compliance with nuclear criticality safety specifications for new or modified equipment before its use. Verification may be based on inspection reports or other features of the quality control system. (ANSI/ANS-8.19, Section 5.5)

- Are there procedures or mechanisms in place and effective to ensure that modifications to equipment and/or processes results in a review of the applicable CSER-CPS-procedure-posting set prior to implementing the modification?
- Are there documented surveillances or methods that ensure that new or modified operations conform to applicable CSERs-CPSs-postings?
- Is there a process for ensuring that no new or modified operation is started until all applicable verification steps have been performed which includes presence of approved CSERs, CPSs, postings, procedures and that no criticality infraction will result from startup?

Criteria: Each supervisor shall require conformance with good safety practices including unambiguous identification of fissile materials and good housekeeping. (ANSI/ANS-8.19, Section 5.6)

- Are all fissile materials labeled as to quantity, chemical form, and isotopic composition?
- Are stored, empty containers labeled as such?
- Are gloveboxes with criticality drains free of loose debris which could potentially clog the drain?
- Is all fissile material stored in appropriate containers?

- Prior to beginning work at a workstation, is there a procedure to verify compliance with criticality safety requirements?
- Is there evidence of fissile material holdup or filings in gloveboxes?
- Are criticality drain liquid traps monitored for adequate liquid levels periodically?

3.0 NUCLEAR CRITICALITY SAFETY STAFF RESPONSIBILITIES

Criteria: The nuclear criticality safety staff shall provide technical guidance for the design of equipment and processes and for the development of operating procedures. (ANSI/ANS-8.19, Section 6.1)

- Does the Nuclear Criticality Safety Staff provide design input for all new or modified equipment?
- Does the Nuclear Criticality Safety Staff review all operating procedures involving fissile materials?
- Does the Nuclear Criticality Safety Staff review and concur on all final equipment and process designs?

Criteria: The staff shall maintain familiarity with current developments in nuclear criticality safety standards, guides, and codes. Knowledge of current nuclear criticality information should be maintained. (ANSI/ANS-8.19, Section 6.2)

- Does the PFP CSR participate in professional development activities such as ANS Standards Committees, Nuclear Criticality Technology Project Workshop, ANS Meetings, LANL/LACEF courses, UNM courses, etc.?
- Does the FDNW Nuclear Criticality Safety Staff participate in professional development activities such as ANS Standards Committees, Nuclear Criticality Technology Project Workshop, ANS Meetings, LANL/LACEF courses, UNM courses, etc.?
- Does the FDH Nuclear Criticality Safety Staff participate in professional development activities such as ANS Standards Committees, Nuclear Criticality Technology Project Workshop, ANS Meetings, LANL/LACEF courses, UNM courses, etc.?
- Is the training and qualification program for CSRs documented and are all the CSRs qualified?
- Is there a training and qualification program for FDNW Nuclear Criticality Safety Staff? Are all the members of the FDNW Nuclear Criticality Safety Staff qualified?
- Is there a training and qualification program for FDH Nuclear Criticality Safety Staff? Are all the members of the FDH Nuclear Criticality Safety Staff qualified?
- Does the Nuclear Criticality Safety Staff (FDH, FDNW, BWHC) have working knowledge of criticality safety related standards, guides, and codes?

Criteria: The staff should consult with knowledgeable individuals to obtain technical assistance as needed. (ANSI/ANS-8.19, Section 6.3)

- Is there synergistic interaction among the FDNW Nuclear Criticality Safety Staff?
- Do the PFP CSRs discuss criticality safety related issues with FDNW Nuclear Criticality Safety Staff frequently, at least several times each week?
- Is information and lessons learned shared among the CSRs at different Hanford facilities?
- What mechanisms are in place to offset the isolation of CSRs and Nuclear Criticality Safety Staff that work in remote locations at Hanford?
- Does the FDNW Nuclear Criticality Safety Staff and the PFP CSR consult with offsite criticality safety experts periodically, particularly retirees from Hanford?

Criteria: The staff shall maintain familiarity with all operations within the organization requiring nuclear criticality safety controls. (ANSI/ANS-8.19, Section 6.4)

- Do all the CSRs for PFP, primary and alternates, participate in assessments of operations and observe fissile material handling and processing operations?
- Do all the FDNW Nuclear Criticality Safety Staff, primary and alternates, frequently inspect the facility and observe fissile material handling and processing operations?
- Do the FDH Nuclear Criticality Safety Staff periodically inspect the facility and observe fissile material handling and processing operations?
- Do the CSRs and the FDNW Nuclear Criticality Safety Staff attend operations planning meetings for new or restarted processes?
- Do the CSRs and the FDNW Nuclear Criticality Safety Staff have access to and familiarity with fissile material operating procedures?
- Do the CSRs and the FDNW Nuclear Criticality Safety Staff frequently attend pre-job briefs and plan-of-the-day meetings?
- Do the CSRs and the FDNW Nuclear Criticality Safety Staff maintain familiarity with reports of deviations from expected process conditions?

Criteria: The staff shall assist supervision, on request, in training personnel. (ANSI/ANS-8.19, Section 6.5)

- Do FDNW Nuclear Criticality Safety Staff participate in training personnel?
- Do PFP CSRs participate in training personnel?
- Is the training documented?
- Does the training provided by the FDNW Nuclear Criticality Safety Staff and the CSRs include job specific criticality safety related information?

Criteria: The staff shall conduct or participate in audits of criticality safety practices and compliance with procedures as directed by management. (ANSI/ANS-8.19, Section 6.6)

- Does the FDNW Nuclear Criticality Safety Staff participate in periodic audits of operations and procedures?
- Do the PFP CSRs participate in periodic audits of operations and procedures?
- Are the results of audits shared among CSRs and the FDNW Nuclear Criticality Safety Staff?
- Does the FDH Nuclear Criticality Safety Staff participate in periodic audits of PFP operations and procedures?

Criteria: The staff shall examine reports of procedural violations and other deficiencies for possible improvement of safety practices and procedural requirements, and shall report their findings to management. (ANSI/ANS-8.19, Section 6.7)

- Are all deficiencies resulting from audits and from criticality safety infractions reviewed by both the CSR and the FDNW Nuclear Criticality Safety Staff?
- Does the FDNW Nuclear Criticality Safety Staff formally report findings and recommendations to PFP management?
- Are lessons learned developed and recommendations made to management?
- Are all criticality safety related deficiencies captured in a database and tracked until closure is verified?
- Is there a mechanism for trending criticality safety related deficiencies so that the collective significance of multiple minor incidents can be assessed and corrected?
- Does the FDH Nuclear Criticality Safety Staff review reports of procedural violations, infractions, reports from FDNW Nuclear Criticality Safety Staff and the PFP CSRs, etc.?
- Are lessons learned from other facilities reviewed by the CSR and the FDNW Nuclear Criticality Safety Staff for potential application at PFP?

4.0 OPERATING PROCEDURES

Criteria: The purpose of operating procedures is to facilitate the safe and efficient conduct of the operation. Procedures should be organized and presented for convenient use by operators. They should be free of extraneous material (ANSI/ANS-8.19, Section 7.1)

- Are criticality controls in procedures clear, concise, free of criticality safety jargon, and easily identifiable?
- Is the criticality safety related information presented in procedures free of unnecessary detail and directly applicable to the job task being performed?
- Do the operators find the criticality safety related instructions easy to understand and follow?

Criteria: Procedures shall include those controls and limits significant to the nuclear criticality safety of the operation. (ANSI/ANS-8.19, Section 7.2)

- Are criticality controls included in operating procedures?
- Are the criticality controls clearly identified as important to safety?
- Is there a clear, unambiguous, link between criticality controls in procedures and their parent CPS and CSER?
- Does FDNW and BWHC have a formalized process for determining which controls are incorporated in procedures?
- Does FDNW and BWHC have a formalized process for ensuring that controls anticipated in the CSER and developed in the CPS are implemented in procedures in a manner consistent with the intent of these documents?
- Do pre-fire plans incorporate criticality safety controls?

Criteria: Supplementing and revising procedures as improvements become desirable shall be facilitated. (ANSI/ANS-8.19, Section 7.3)

- Are procedures revised based on lessons learned to reduce occurrence of deviations and infractions?
- Do operators have a feedback process whereby improvements to procedures can be implemented?
- Are adequate resources available to facilitate procedure improvements as they are identified?
- Are procedure revisions timely?
- What change control mechanisms are in place that assure only the current, approved procedures are utilized?

Criteria: Active procedures shall be reviewed periodically by supervision. (ANSI/ANS-8.19, Section 7.4)

- Are procedures periodically reviewed?
- Do the CSR and the FDNW Nuclear Criticality Safety Staff periodically participate in reviews of active operating procedures?
- What mechanisms are in place to ensure that all procedures are reviewed as planned?

Criteria: New or revised procedures impacting nuclear criticality safety shall be reviewed by the nuclear criticality safety staff. (ANSI/ANS-8.19, Section 7.5)

- Do all new or revised procedures receive review by the CSR?
- Do all new or revised procedures receive review by the FDNW Nuclear Criticality Safety Staff?
- Is there a mechanism for resolving conflicting comments from the CSR and the FDNW Nuclear Criticality Safety Staff?

Criteria: Procedures should be supplemented by posted nuclear criticality safety limits or limits incorporated in operating check lists or flow sheets. (ANSI/ANS-8.19, Section 7.6)

- Are criticality safety postings easy to understand by operators?
- Do the postings contain only information controlled by the operator performing the task?
- Do the postings require any analysis on the part of the operator such as decoding "IF-THEN", "EITHER-OR" type options to select appropriate controls?
- What is the relationship between the controls in the posting and the controls in the procedures?
- Is there a formalized process for determining which controls appear on postings and which appear in procedures?
- What mechanism is in place to ensure that the controls in the posting are consistent with those intended by the parent CPS and CSER?
- Are postings easy to read from normal operator positions at the workstation?
- Do operators rely primarily on postings to obtain their criticality safety controls?
- Are all the controls necessary for safety included in postings?

Criteria: Deviations from operating procedures and unforeseen alterations in process conditions that affect nuclear criticality safety shall be documented, reported to management, and investigated promptly. Action shall be taken to prevent a recurrence. (ANSI/ANS-8.19, Section 7.7)

- Are potential infractions identified from deviations from postings alone, or is the CPS consulted before declaring an infraction has occurred?
- Is it possible to violate a posting and still be within the scope of controls imposed by the CPS?
- How are infractions graded?
- Are the contingencies and barriers for a given operation readily available to the CSR and the FDNW Nuclear Criticality Safety Staff investigating potential infractions?
- Is there provision for management to upgrade the assigned severity level of infractions due to adverse trends?
- Is there provision for management to upgrade the assigned severity level of infractions due to the magnitude of the decrease in the margin of subcriticality?
- Do operators immediately stop work, leave the immediate vicinity, notify supervision, post the area, and contact the CSR promptly when a potential infraction is identified?
- Does the FDNW Nuclear Criticality Safety Staff respond to the scene of a potential infraction?
- Are the responsibilities of the CSR and the FDNW Nuclear Criticality Safety Staff defined for responding to a potential infraction?
- Does the FDNW Nuclear Criticality Safety Staff participate in management critiques of infractions, assigning levels of infraction, and developing corrective actions?
- Are infractions resolved promptly and normal operations restarted?
- Are corrective actions stemming from criticality infractions entered into a tracking database and monitored until closure?
- Are minor criticality infractions tracked and trended?
- Are all criticality infractions, regardless of severity, documented and shared among the other CSRs at Hanford, the entire FDNW Nuclear Criticality Safety Staff, and the FDH Nuclear Criticality Safety Staff?
- Does BWHC independent safety have an appeal mechanism if infractions are under reported or downgraded inappropriately?

Criteria: Operations shall be reviewed frequently (at least annually) to ascertain that procedures are being followed and that process conditions have not been altered so as to affect the nuclear criticality safety evaluation. (ANSI/ANS-8.19, Section 7.8)

- Are all operations audited at least annually?
- How do annual reviews determine that procedures are being followed?
- Do audits and reviews monitor the configuration of the facility and processes which could adversely affect criticality safety, such as movements of criticality detectors, installation of new equipment, inoperable emergency enunciators, etc.?
- Are there procedures in place that verify that changes to process equipment over time have not degraded compliance with criticality safety controls?
- Prior to work being restarted in inactive equipment, is there a procedure for verifying the equipment conforms to criticality safety requirements?
- Do annual reviews of operations look at all the elements of the criticality safety program affecting operations?

5.0 PROCESS EVALUATION FOR NUCLEAR CRITICALITY SAFETY

Criteria: Before starting a new operation with fissile materials or before an existing operation is changed, it shall be determined that the entire process will be subcritical under both normal and credible abnormal conditions. (ANSI/ANS-8.19, Section 8.1)

Criticality safety evaluations shall conform to the requirements of ANSI/ANS-8.1, "Nuclear Criticality Safety in Operation with Fissionable Material Outside Reactors."

- Are natural phenomena hazards, especially seismic, considered in developing accident scenarios?
- Are firefighting scenarios considered (i.e. addition of moderator, displacement of fissile material in water streams, etc.)?
- Do the contingencies credited represent events which are at least unlikely?
- Are all credible process upsets considered and either controlled or dispositioned appropriately?
- Are the criticality safety evaluations produced by FDNW timely?
- Does FDNW have formalized procedures for generating criticality safety evaluations?
- Are the criticality safety evaluations produced by staff familiar with the facility and operations under consideration?
- Does the FDNW staff take full advantage of simplifying methods, bounding calculations, critical experiment data, handbook data, etc. where appropriate to minimize dependence upon monte carlo techniques?
- Does the FDNW staff have access to all existing PFP criticality safety evaluations as reference?
- Is there criteria for determining the magnitude of process change which can be implemented without revising the criticality safety evaluation?
- Does the FDNW Nuclear Criticality Safety Staff work as a team with BWHC operations and the CSR to develop credible accident scenarios and controls?

Criteria: The nuclear criticality safety evaluation shall determine and explicitly identify the controlled parameters and their associated limits upon which nuclear criticality safety depends. (ANSI/ANS-8.19, Section 8.2)

- Are controls developed in the criticality safety evaluation for each contingency?
- Are controlled parameters, contingencies, and credited barriers explicitly documented?
- Does the criticality safety evaluation identify those controls which are to be included in procedures and those which should be included in postings?

Criteria: The nuclear criticality safety evaluation shall be documented with sufficient detail, clarity, and lack of ambiguity to allow independent judgment of results. (ANSI/ANS-8.19, Section 8.3)

- Do the criticality safety evaluations conform to DOE-STD-3007-93, *Guidelines for Preparing Criticality Safety Evaluations at Department of Energy Non-Reactor Nuclear Facilities*?
- Does FDNW have formalized procedures for generating criticality safety evaluations?
- Is there a change control and document control system in place for criticality safety evaluations?
- Are internal memorandum used to generate limits and controls in place of formal evaluations?
- Are temporary limits and evaluations (i.e. those that expire after a specified period) used?
- Are all assumptions fully documented in the criticality safety evaluation?
- Can the criticality safety evaluation be read and understood by the CSR and line supervision?

Criteria: Before starting operation, there shall be an independent assessment that confirms the adequacy of the nuclear criticality safety evaluation. (ANSI/ANS-8.19, Section 8.4)

- Do all criticality safety evaluations receive and independent technical peer review before approval for use?
- Is there a process for confirming that all credited engineered features of a system or process are in place and meet the specifications anticipated by the evaluation prior to starting operations?
- Is there a process for assuring that the criticality safety evaluation, CPS, postings, and procedures are all consistent prior to starting operations?

6.0 MATERIALS CONTROL

Criteria: The movement of fissile materials shall be controlled. (ANSI/ANS-8.19, Section 9.1)

- Are there procedures in place to control the movement of fissile material within PFP between material balance areas?
- Are there procedures in place to control movement of fissile material within a single material balance area?
- Are there procedures in place to control transfers of fissile material out of PFP?
- Do the procedures have requirements to verify compliance with criticality safety limits at the shipping and receiving points of the transfer prior to performing the movement?

Criteria: Appropriate material labeling and area posting shall be maintained specifying material identification and all limits on parameters that are subject to procedural control. (ANSI/ANS-8.19, Section 9.2)

- Are all fissile materials labeled and include, at a minimum, fissile mass, isotopic composition, chemical form, and moderator content?
- Are all fissile material storage areas posted as such with criticality controls clearly identified?

Criteria: If reliance is placed on neutron absorbing materials that are incorporated into process materials or equipment, control shall be exercised to maintain their continued presence with the intended distributions and concentrations. (ANSI/ANS-8.19, Section 9.3)

Any use of borosilicate Raschig Rings shall conform to the requirements of ANSI/ANS-8.5, "Use of Borosilcate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material."

- Are any processes dependent upon the presence of fixed neutron absorbers?
- Are controls in place to monitor the continued effectiveness of credited neutron absorbers?
- Are any soluble neutron absorbers credited?
- If soluble neutron absorbers are credited, are there mechanisms in place to ensure they remain in their intended distribution and concentration?
- Are practices dealing with fixed neutron absorbers generally consistent with ANSI/ANS-8.21, *Use of Fixed Neutron Absorbers in Nuclear Facilities Outside Reactors?"*

Criteria: Access to areas where fissile material is handled, processed, or stored shall be controlled. (ANSI/ANS-8.19, Section 9.4)

- Is access to fissile material handling areas controlled such that only trained, qualified, and authorized personnel can handle fissile material?
- Does facility management verify the qualification of fissile material handlers prior to authorizing work?

Criteria: Control of spacing, mass, density, and geometry of fissile material shall be maintained to assure subcriticality under all normal and credible abnormal conditions. (ANSI/ANS-8.19, Section 9.5)

Are fissile material storage areas in conformance with the requirements of ANSI/ANS-8.7, "Guide for Nuclear Criticality Safety in the Storage of Fissile Materials" where applicable?

- Are all containers of residue and product fissile material stored in fixed arrays or have engineered spacers attached?
- Where administrative spacing controls are in place, has the criticality safety evaluation demonstrated that the system will remain subcritical in a seismic event?
- Are administrative spacing controls credited as unlikely events in criticality safety evaluations?
- Are material balance checksheets or equivalent used to maintain a running log of fissile mass contained in gloveboxes, storage arrays, etc.?
- Where engineered features are credited for criticality control are there periodic inspections to verify they are continuing to perform their intended function?
- For solution storage areas are there procedures in place to detect concentration and stratification changes in the solution?
- Are fissile solutions periodically monitored for changes in pH?
- Are isolated, inactive fissile solution storage tanks protected by double-block-and-bleed valve arrangements, or equivalent, where the addition of fissile material is prohibited?
- Can the mass and location of all fissile materials in a glovebox be determined by inspection of logs posted on the glovebox?
- Has the criticality safety evaluation determined that all storage vaults, gloveboxes, and solution storage arrays will remain subcritical under credible seismic conditions?

7.0 PLANNED RESPONSE TO NUCLEAR CRITICALITY ACCIDENTS

Criteria: Guidance for the installation of nuclear criticality accident alarm systems may be obtained from the American National Standard Criticality Accident Alarm System, ANSI/ANS-8.3-1979[2]. Evacuation signals are addressed in the American National Standard Immediate Evacuation Signal for Use in Industrial Installations. ANSI/ANS-N2.3-1979[3]. (ANSI/ANS-8.19, Section 10.1)

- Is there documentation to show that the installed criticality detectors can detect the minimum accident of concern?
- Does documentation exist to show that existing criticality detector coverage at PFP provides the necessary redundancy and detection thresholds?
- Is there one group responsible for analyzing criticality detector locations?
- Is there a procedure that governs the evaluation of criticality detector locations?
- Is the criticality alarm audible at all locations where personnel are potentially located?
- Where the alarms are not audible, are beacons present and visible?
- Does the criticality accident alarm system prevent false alarms?
- When portable, temporary alarms are used do they meet the requirements of ANSI/ANS-8.3?
- Before portable, temporary alarms are used is there an analysis to demonstrate that the detectors will alarm if the minimum accident of concern occurs?

Criteria: Emergency procedures shall be prepared and approved by management. Organizations, on and off-site, that are expected to provide assistance during emergencies shall be informed of conditions that might be encountered. They should be assisted in preparing suitable emergency response procedures. (ANSI/ANS-8.19, Section 10.2)

- Are emergency procedures available and approved?
- Do offsite organizations participate in emergency exercises for criticality scenarios?
- Do offsite organizations required to respond in the event of a criticality accident have emergency response procedures?
- Does FDNW Nuclear Criticality Safety Staff have a role in responding to criticality accidents?
- Are there procedures in place to provide estimates of source terms and fission estimates in the event of a criticality accident?
- Are offsite responders aware of the plant conditions which might be encountered in the event of a criticality accident?

Criteria: Emergency procedures shall clearly designate evacuation routes. Evacuation should follow the quickest and most direct routes practicable. These routes shall be clearly identified and should avoid recognized areas of higher risk. (ANSI/ANS-8.19, Section 10.3)

- Do emergency procedures designate evacuation routes?
- Are evacuation routes identified and avoid areas of higher risk?

Criteria: Personnel assembly stations, outside the areas to be evacuated, shall be designated. Means to account for personnel shall be established. (ANSI/ANS-8.19, Section 10.4)

- Are personnel assembly stations clearly identified?
- Have the designated assembly areas been analyzed in advance to minimize radiation exposures from a criticality accident?
- Are there procedures to account for all facility personnel, including visitors, in the event of an evacuation?

Criteria: Personnel in the area to be evacuated shall be trained in evacuation methods and informed of routes and assembly stations. Provision shall be made for the evacuation of transient personnel. Drills shall be performed at least annually to maintain familiarity with the emergency procedures. Drills shall be announced in advance. (ANSI/ANS-8.19, Section 10.5)

- Are personnel trained to evacuate by the quickest and most direct route?

- Do personnel know where they are to assemble?
- Are criticality drills performed at least annually?
- Are annual criticality drills an OSR requirement?
- Does the alarm tone sounded for a drill mimic the alarm which will be heard in a real accident?
- Are personnel pre-staged for criticality alarm drills or are they at their normal work locations?
- Do multiple buildings participate in criticality alarm drills?
- Will more than one facility go into alarm if a criticality accident occurs?
- Are facility visitors indoctrinated in proper evacuation procedures?
- Is an emergency command center established for criticality accident drills?
- Do FDNW Nuclear Criticality Safety Staff respond to the emergency command center during drills?
- Does the PFP CSR respond to the emergency command center during drills?

Criteria: Arrangements shall be made in advance for the care and treatment of injured and exposed persons. The possibility of personnel contamination by radioactive materials shall be considered. (ANSI/ANS-8.19, Section 10.6)

- Are procedures in place to care for injured and exposed personnel?
- Are area hospitals equipped and trained to handle personnel with extreme radiation exposures?
- Are procedures in place to deal with contaminated personnel?

Criteria: Planning shall include a program for the immediate identification of exposed individuals and should include personnel dosimetry. Guidance for dosimetry may be found in American National Standard Dosimetry for Criticality Accidents, N13.3-1969 (R 1981) [4]. (ANSI/ANS-8.19, Section 10.7)

- Do radiation monitoring personnel participate in criticality drills?
- Do radiation monitoring personnel respond to the assembly areas to monitor for radioactive contamination?

Criteria: Instrumentation and procedures shall be provided for determining the radiation at the assembly area and in the evacuated area following a criticality accident. Information should be correlated at a central control point. (ANSI/ANS-8.19, Section 10.8)

- Are procedures in place to monitor radiation levels at the assembly areas?
- Are both gamma and neutron detectors available?
- Are radiation monitoring personnel trained in the interpretation of radiation data as it pertains to an ongoing criticality accident?
- Are procedures in place to move personnel from designated assembly areas in the event unacceptably high radiation fields are encountered?
- Are radiation readings reported to the emergency command center?

Criteria: Emergency procedures shall address re-entry procedures and the membership of response teams. (ANSI/ANS-8.19, Section 10.9)

- Do emergency response procedures address re-entry?
- Can the criticality alarm system be reset remotely prior to re-entry?
- What is the membership of re-entry teams?
- Are members trained in the use of proper equipment such as supplied breathing air?
- Does the incident commander have pre-determined criteria for authorizing re-entry?

RESULTS

The review will be documented in a report by April 17, 1998. The report will draw conclusions about the adequacy of the criticality safety program, identify deficiencies and needed corrective actions, and provide recommendations to improve the program.

RESOURCES

Dr. Jerry McKamy, Team Leader
Adolf Garcia
Dr. Ron Knief
Dr. Douglas Croucher
Tom Reilly
George Bidinger
Gypsy Tweed
Cindie Jensen

Review Topics:

1. Management Responsibilities - DOE RL
2. Management Responsibilities - FDH
3. Management Responsibilities - FDNW
4. Management Responsibilities - BWHC
5. Supervisor Responsibilities - BWHC
6. Nuclear Criticality Safety Staff Responsibilities - FDNW & BWHC
7. Operating Procedures - BWHC
8. Operating Procedures - Dyncorp
9. Process Evaluation for Nuclear Criticality Safety
10. Materials Control
11. Planned Response to Nuclear Criticality Accidents
12. Configuration Management
13. Training and Professional Development
14. Corrective Action Tracking and Closure

Review Assignments:

Dr. Jerry McKamy - Team Leader, 1, 3
Adolf Garcia - 1, 4, 13
Dr. Ron Knief - 11, 13
Dr. Douglas Croucher - 2, 10, 14
Tom Reilly - 5, 6, 7, 8, 9
George Bidinger - 5, 6, 7, 8, 9
Gypsy Tweed - 11, 12
Cindie Jensen - Logistic Support

SCHEDULE

March 30 - April 3, 1998 Site Visit

April 17, 1998 Report Issued

REVIEW FORM

Criticality Safety Program
Review Form

Review Area:
__ Management Responsibilities
__ Supervisory Responsibilities
__ Nuclear Criticality Safety Staff Responsibilities
__ Operating Procedures
__ Process Evaluation for Nuclear Criticality Safety
__ Materials Control
__ Planned Response to Nuclear Criticality Accidents

Form No._____

Date:_____

1. Identification Section:

A. Observation (including overall significance and basis):

B. References:

C. Information Requested (list of information needed to complete this form)

2. Reviewers' Signature Section:

Originator _____ Date: _____

Approved _____ Date: _____

Criticality Safety Program
Review Form

Review Area:
__ Management Responsibilities
__ Supervisory Responsibilities
__ Nuclear Criticality Safety Staff Responsibilities
__ Operating Procedures
__ Process Evaluation for Nuclear Criticality Safety
__ Materials Control
__ Planned Response to Nuclear Criticality Accidents

Form No._____

Date:_____

3. Contractor Response (Provide basis and references):

4. Contractor Signature Section:

Contractor Originator: _____ Date: _____

Contractor Approval: _____ Date: _____

BIOGRAPHIES

Dr. Jerry N. McKamy – Dr. McKamy currently holds the position of Nuclear Criticality Safety Specialist in the Office of Engineering Assistance and Site Interface, EH-34, with the Department of Energy (DOE). Dr. McKamy received his Ph.D. in experimental nuclear physics from The Ohio State University (1982) and a BS in physics from the University of Texas at Arlington (1976). Dr. McKamy's areas of expertise include nuclear criticality safety and non-destructive assay. He started his nuclear career at the Critical Mass Laboratory at Rocky Flats in 1983. From 1983 through 1987 he performed critical experiments, validated Monte Carlo criticality safety codes, and was the responsible criticality safety engineer for various Rocky Flats production buildings. In 1987, Dr. McKamy joined the Safeguards Measurements Group as the Principal Engineer for neutron non-destructive assay. In 1989 as Manager of Safeguards Measurements, Dr. McKamy led the development and implementation of the Rocky Flat's non-destructive assay program to measure the plutonium holdup in the ventilation ducting. Late in 1990, Dr. McKamy returned to the Criticality Engineering Group at Rocky Flats as Manager. His major accomplishment as Manager of Criticality Engineering was changing to a formalized, standards based criticality safety program which was foundational to the successful Resumption of Operations in Buildings 559 and 707. In 1994, Dr. McKamy joined the consulting firm of M.H. Chew and Associates (CAI) where he primarily provided criticality safety support to the DOE Rocky Flats Field Office. In addition, he developed the criticality safety design criteria for the BNFL Team's Plutonium Stabilization and Packaging System and helped in the resolution of the Hanford TWRS Criticality Safety Question. Since joining EH-34 in the fall of 1996, Dr. McKamy has been actively assisting DOE Field Offices at Rocky Flats, Y-12, Richland, and Lawrence Livermore National Laboratory in the area of criticality safety while being a principal in drafting the DOE Implementation Plan in response to Defense Nuclear Facilities Safety Board Recommendation 97-2.

George H. Bidinger – Mr. Bidinger is an independent consultant from Rockville, Md. He holds a Masters degree in physics from John Carroll University. As a consultant, Mr. Bidinger has provided safety evaluations and/or peer reviews for the Portsmouth Gaseous Diffusion Plant, the Babcock & Wilcox Naval Nuclear Fuel Division, the Atomic Energy Control Board of Canada, and the Defense Nuclear Facilities Safety Board at the Rocky Flats and Savannah River sites. He has conducted or participated in audits and assessments at Babcock and Wilcox, at USEC□s Paducah and Portsmouth Gaseous Diffusion Plants, the K-25 plant, and the Y-12 plant for MMES and LMES. Mr. Bidinger has supported the Nuclear Regulatory Commission and Agency for International Development program by providing regulatory capability training to the Russians for the licensing and regulation of fuel fabrication and certification of gaseous diffusion plants.

Mr. Bidinger is retired from the U.S. Nuclear Regulatory Commission (NRC), and its predecessor the U. S. Atomic Energy Commission (AEC), where he served in supervisory, inspection, and engineering analysis positions. Prior to retiring from the AEC/NRC, he provided NCS engineering analyses for enrichment and fuel fabrication facilities, conducted NCS inspections and assessments, and supervised the environmental, chemical, radiation safety, NCS, and fire safety engineers preparing safety evaluation reports to support licensing actions for all commercial and naval-reactor fuel fabricators. Previously he worked as a criticality supervisor for the nuclear fuel operations of the Coors Porcelain Company and as a criticality safety specialist for the Rocky Flats Plant. Mr. Bidinger is a former Chair and an active member of the American Nuclear Society's Nuclear Criticality Safety Division. Mr. Bidinger has also helped organize ANS topical and international conferences on nuclear criticality safety. He served as NRC representative to the ANS N-16 consensus committee for ANSI/ANS-8-series Standards; he continues as an individual of N16. He also has been a member of several ANS-8 writing groups for these Standards programs. He has served as a faculty member for the University of New Mexico's Nuclear Criticality Safety Short Course since 1977 and the University's Workshop for Managers in Nuclear Criticality Safety in Albuquerque, Oak Ridge and Denver since 1994.

Dr. Douglas W. Croucher – Mr. Croucher is a Fellow Engineer for TENERA, L.L.C. He holds a Ph.D. in Nuclear Engineering from the University of New Mexico, and will receive a Masters of Environmental Policy and Management from the University of Denver in June, 1998. He has 24 years of experience, 18 years in management, and numerous technical publications in the field of nuclear safety. He participated in and managed nuclear reactor safety research and engineering at the Idaho National Engineering Laboratory for 13 years. At Rocky Flats for eight years, he was Director of Nuclear Safety for two years, Program Manager of Independent Safety Review for five years, and Chairman of the Rocky Flats Nuclear Criticality Safety Committee for four years. He has performed independent assessments and Operational Readiness Reviews for various facilities at Rocky Flats during the last three years. He led Readiness Assessments for the Hydroxide Precipitation Process in Building 771, and draining high concentration plutonium solutions from tanks in Building 771 and transport to Building 371. Areas of expertise include criticality safety, nuclear safety, authorization basis, engineering and management. His training includes root cause analysis. He is currently supporting readiness assessments for several activities at Rocky Flats.

Dr. Croucher is very active in the American Nuclear Society (ANS), serving on the Program and Executive Committees of the Nuclear Criticality Safety Division and the Nuclear Reactor Safety Division. He is a member of the Decontamination, Decommissioning, and Reutilization Division Executive Committee, and is Technical Program Chairman for Spectrum =98, an ANS international topical meeting on nuclear and hazardous waste management, decontamination and decommissioning.

Adolf S. Garcia – Mr. Garcia has 22 years experience in the nuclear criticality safety field. Mr. Garcia was involved in criticality safety work at Argonne National Laboratory (ANL) from 1958 to January 1995. His work at ANL included responsibilities as the criticality safety engineer for the Hot Fuel Examination Facilities North and South, Criticality Safety Representative for the Fuels Cycle Division and for the Reactor Experiments and Examinations Division. He also served as a member of ANL's Criticality Hazards Control Committee and was a charter member of the Laboratory's Nuclear Facility Safety Committee. These committees, at the time of Mr. Garcia's association with ANL, took a very active role in the review and approval of all safety documents and operations associated with fissile materials. From February 1995 to the present Mr. Garcia has been part of DOE-ID as the Senior Nuclear Criticality Safety Specialist.

Mr. Garcia is a member of ANS Standards Subcommittee 8 (committee responsible for the series of ANSI/ANS Nuclear Criticality Safety Standards), and the chairman of the main criticality safety standard: ANSI/ANS 8.1 "Nuclear Criticality safety in Operations with Fissionable Material Outside Reactors." Mr. Garcia is a charter member (1983) of the "Nuclear Criticality Technology and Safety Committee." This group was formed to provide guidance and advise DOE's Nuclear Criticality Safety National Program. Mr. Garcia is the chairman of the "Criticality Safety Support Group," a group of experienced personnel in the field of nuclear criticality safety, supporting DOE's Nuclear Criticality Safety Program Management Team. He is also a Member of the faculty of the University of New Mexico Nuclear Criticality Safety Short Course. Mr. Garcia holds a Masters Degree in Nuclear engineering from Louisiana State University and has been very active in the Nuclear Criticality Safety Division of the American Nuclear Society for the last twenty-two years.

Dr. Ronald A. Knief – Dr. Knief is a Principal Consultant with Ogden Environmental and Energy Services, is a specialist in nuclear-criticality, -fuel-facility and -reactor safety; safety, environmental-compliance and management-system evaluation; risk management; and associated performance-based training. Prior to 1990, he spent ten years at the Three Mile Island Nuclear Station serving in training management and safety & risk management positions and six years on the faculty of chemical and nuclear engineering at the University of New Mexico. Dr. Knief holds a B.A. degree physics, mathematics and economics from Albion College and a Ph.D. in nuclear engineering from the University of Illinois at Urbana-Champaign. He is a fellow of the American Nuclear Society, Vice Chair of N16 Consensus Committee for ANSI/ANS-8 Standards, Past Chair of the Nuclear Criticality Safety Division, and Recipient of 1985 Nuclear Criticality Safety Division Achievement Award.

Dr. Knief has conducted many detailed on-site nuclear criticality safety assessments of nuclear criticality safety activities and programs for nonreactor nuclear facilities. The most recent client has been the U.S. Department of Energy's Oak Ridge Operations Office as participant on the multi-disciplinary team helping the DOE develop the compliance plan for the Paducah (KY) and Portsmouth (OH) Gaseous Diffusion Plants (GDP) to meet the U.S. Nuclear Regulatory Commission (NRC) certification requirements. Specific activities included serving as observer for DOE of NRC Assessment Team Visits and performing compliance-plan-issue close-out evaluations at both of the sites. Assessments have been performed for DOE M&O Contractors at the Oak Ridge Y-12 Plant, Oak Ridge National Laboratory, the Mound Plant, Savannah River Site, Fernald, the Waste Isolation Pilot Plant (WIPP), and Argonne National Laboratory. Assessments of USNRC Licensee facilities have been performed at General Electric Nuclear Fuels, Nuclear Fuels Services, Battelle-Columbus, Babcock & Wilcox (Naval Nuclear Fuel Division, Apollo, and Parks Township Facilities), and Westinghouse Cheswick.

Dr. Knief has developed and conducted training and education on nuclear criticality safety for NCS engineers and for management, supervisory, and engineering personnel. Thirty (30) professional development courses have been offered in conjunction with the University of New Mexico, on-campus and at the Oak Ridge Y-12 Plant, Rocky Flats Environmental Technology Site, and British Nuclear Fuels. Separate courses have been tailored to the needs of USDOE's Albuquerque and Oak Ridge Operations Offices, respectively, and the Westinghouse Hanford Company. He is also lead instructor for the "Nuclear Criticality Safety Training for Fuel Facility Inspectors" course taught four times for NRC staff and for regulatory and nuclear-facility personnel in Moscow, Russia and Kiev, Ukraine. Dr. Knief is author of *Nuclear Criticality Safety -- Theory and Practice*, the only textbook on the subject, published by the American Nuclear Society and of *Nuclear Engineering -- Theory and Technology of Commercial Nuclear Power*.

Thomas A. Reilly – Mr. Reilly has 27 years of experience in plutonium and uranium processes at the Savannah River Site. For the past 20 years he has had both managerial and technical assignments concentrated on the nuclear criticality safety aspects of these operations. He has provided the full range of criticality safety services to remotely operated uranium/plutonium separations plants, plutonium and uranium glovebox operations, fuel storage pools, fuel fabrication facilities, and waste handling facilities. Mr Reilly served as the criticality safety functional area manager for plutonium facilities at the Savannah River Site that successfully completed DOE ORRs. He served as chairman of the Savannah River Site 200 Area Criticality Safety Committee and as a member of the 300 Area Criticality Safety Committee. Currently he is the chairman of the Westinghouse M&O Criticality Safety Committee. He served on the DOE Task 2 and Task 3 criticality safety review teams at Y-12 in response to DNFSB recommendation 94-4 and has participated in 3 annual criticality safety assessments at the Rocky Flats Plant.

Mr. Reilly is a member of the Nuclear Criticality Safety Division of ANS and served on the Program Committee for that division. He is a member of the ANS-8 Standards Subcommittee. He is chairman of the Working Group for ANS Standard 8.14 and serves on the Working Group for 8.22. He has also participated in review groups for DOE Orders and Standards.

Gypsy Tweed – Ms. Tweed has more than eleven years of experience in the nuclear industry and 6 years Criticality Safety experience including DOE oversight; USQs/TSRs/SARs/BIOs; Parallax technical manager for five criticality safety contracts. She has provided consulting support to the Department of Energy (DOE) and DOE facilities in the development, upgrade, and training of various criticality Safety programs. She also has criticality safety experience at the Rocky Flats plant. Mrs. Tweed has served as Nuclear Safety Manager, responsible for criticality safety programs at two DOE sites. She has extensive experience in utilizing the modular code system for performing Standardized Computer Analysis for Licensing Evaluations (SCALE, including the KENO Va module), MCNP, and MORSE. This includes criticality code validation, peer review and oversight.

Appendix B

Comments On The Draft BWHC Response To The Kidd Report

COMMENTS ON THE DRAFT BWHC RESPONSE TO THE KIDD REPORT

1.A. An OSR requirement is not a policy statement. ANSI/ANS-8.19 requires a policy statement communicated to all fissile material handlers.

1.C. The external assessments performed by FDH should be institutionalized. Other sites have programmatic requirements for comprehensive external reviews utilizing recognized outside experts.

1.D. The criticality safety engineer function within BWHC needs to be expanded further. The specific elements mentioned in the Kidd report (training, reviewing design documentation, procedures, CPSs, postings, infraction investigation, etc.) should be included in a position description or defined in a roles and responsibilities procedure. The interaction of the criticality safety engineer with the CSR and other BWHC disciplines should be defined.

2.A. & B. The BWHC response does not address the concern. The postings, CPSs, and CSERs should be clearly linked and traceable. Postings should be simple and comprehensive for the task being performed. Operations managers should not have the ability to modify postings. The CSR or the CSE should be the only two staff members permitted to modify a posting. Revisions to postings should be logged and tracked such that the link with the parent CPS and CSER is unambiguous and controlled.

2.D. *All* affected managers must review and approve CPSs and postings. The BWHC response is not clear on this issue. The response does not address the documentation recommendation.

2.E. It is precisely *because* the postings are a subset of the CPS and CSER controls that the NCS specialist should review the postings. Alternatively, a defined procedure could be defined specifying when certain controls should be included in the postings and which controls should be included in procedures. The BWHC response does not address the root issue of the lack of a process to ensure that the controls developed in the CSER are accurately mapped into postings.

2.F. A more appropriate response would be to take credit for the CPS-Posting review, which has been initiated. This should resolve many, if not all, the posting consistency issues and provides a venue to clear up an confusing language.

2.G. The operating procedures should be reviewed by the NCS Specialist. This could off-load some of the responsibility from the CSR and is appropriate according to ANSI/ANS-8.19.

3.C. The trending/root cause analysis should be extended to include all level 4 "non-reportable" infractions.

5.B. The BWHC response does not address the issue. "Professional judgment" is not an adequate basis for placing TCASs. A procedure for determining and documenting coverage as specified in ANSI/ANS-8.3 is required.

6.A. This action depends upon successful completion of the CSLEP program and cannot be marked complete. The CSLEP program should include a fault tree for showing the contingencies for operations

and, thereby, assure that adequate controls are in place, that no single credible abnormal condition can result in a criticality, and serve as a functional guide for categorization of infractions when they occur.

6.B. The BWHC response misses the mark. In the CSERs, the term "contingency" is used interchangeably with "control." Controls are not contingencies. A contingency is prevented by imposing controls (i.e. barriers) on the process. A contingency is an unlikely process upset. A rule of thumb is that "unlikely" corresponds qualitatively to a frequency of once in a hundred years. The current practice of counting every administrative control as a "contingency" is incorrect and should be changed promptly. This over-counting of "contingencies" has already led some auditors to be skeptical about the graded infraction program. Justification should be provided in the CSER and the upcoming CSLEP program for the adequacy of selected controls in reducing the abnormal process upset frequency to an unlikely event (i.e. contingency).

7.B. This is another fruitful area for utilizing the NCS specialist to off-load some of the responsibility from the CSR. The CSR is overloaded. The NCS specialist can, and should, have the responsibility for review, approval, and sign-off on equipment designs and modifications to processes and procedures.